Reducing the Research to Practice Gap (R2PG) with Faculty Team Collaborations

Sheila Tabanli, Ph.D.
Assistant Teaching Professor
Sheila.Tabanli@rutgers.edu

For more information on OLSUME: https://olsume.org/
Presenter’s Background

Sheila Tabanli is a mother, a wife, and an educator.

K-12 Ed Setting

- National Blue Ribbon K-12 suburb school
  - Various roles related to student, parent, and faculty affairs
- Urban high school
  - Restructured the math dept. that resulted in students’ math growth and math teacher retention

Higher Ed Setting

- Designed an innovative math curriculum to reduce math achievement gap (Math 125)
- Faculty Support Group Facilitator (Reducing Research 2 Practice Gap in Teaching (RR2PG))
- Grant Awardee:
  - Tyler Clementi Center for Diversity Education and Bias Prevention fellowship, Reducing the novice-expert perception gap to increase diversity in STEM". (20
  - Rutgers Equity and Inclusion faculty collaboration grant, FAN into STEM (Faculty Affinity Network), 23-2024)
Gaps in Math Teaching & Learning

- Math Readiness Gap
- Math Achievement Gap
- Pandemic Learning Gap

- Research-to-Practice Gap / Faculty Collaboration Gap
- Novice-to-Expert Perception Gap
- Novice Perception Gap about Effective Math Learning & Studying
Seminar Objectives

R2PG
Reducing the gap between research on student learning and the higher-ed teaching practices (R2PG)

Framework
Developing “Learning Bits” grounded on a proposed instructional framework as no/low stakes assessments.

Faculty Teams
Fostering student-centered teaching practices through faculty team collaborations

DEI
Offering equitable math learning opportunities
Math 125
(An innovative, hybrid, interdisciplinary course)
Pólya’s Framework for Mathematical Problem Solving

- Problem-solving plays an important role in mathematics (and in life).
- According to NCTM (National Council of Teachers of Mathematics), the term "problem solving" refers to mathematical tasks that have the potential to provide intellectual challenges for enhancing students' mathematical understanding and development.
- The importance of metacognition in mathematical problem solving is evident.
Go to student.desmos.com and type in:

DFA ZBN
Table 4. Utility Assessment and Ratings of Generalizability for Each of the Learning Techniques

<table>
<thead>
<tr>
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</tr>
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### Framework for Incorporating Cognitive Science & SEL Principles Into Instruction*

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<tr>
<th>Prior to Class</th>
<th>During Class</th>
<th>After Class</th>
</tr>
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</table>
| • Priming Effect.  
• Retrieval Practice. | • Retrieval Practice.  
• Dual coding.  
• Chunking.  
• Elaborative Interrogation. | • Retrieval Practice.  
• Pomodoro.  
• Spaced Repetition.  
• Interleaving. |

* Manuscript in writing

Social Emotional Learning (SEL)

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Learning Bits - Calculus I Instruction

• 5 minute announcements/reminders (sleep, cellphones, resources etc)
• Retrieval practice as breaks during instruction
• Re-visit students’ why
• Chunking the procedures
• Dual coding (algebraic solutions and visuals)
• Spaced repetition and interleaving assignments
Faculty Team Collaborations

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Faculty Team

- Proposed the group in 2022 to Rutgers TEN leadership team
- Advertised by multiple units at Rutgers
- First group met in Spring 2023 (multi-disciplinary)
- Second group will meet in Fall 2023 (multi-campuses)
- Designed a Canvas site
  - Bi-monthly meetings
  - Design Memo, Reading Tasks, Activities
  - SMART Goal/Peer Accountability
  - Classroom Visits/Peer Observations Reports
  - Teaching Portfolio
  - Faculty Sense of Belonging
  - Team Grants, Collaborations
<table>
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<tr>
<th>Faculty Team Participants</th>
<th>Course Details</th>
</tr>
</thead>
</table>
| Laurent Vera              | Retrieval Practice  
                          | 100 level course with ~70 students |
| (Calculus II for Engineering Course) |                |
| Lyra Stein                | Elaborative Interrogation  
                          | 300 level course with ~300 students |
| (Abnormal Psychology Course) |                |
| Anna Kornienko            | Practice Testing  
                          | 200 level course with ~25 students |
| (Analytical Chemistry Course) |                |
Lyra - Psychology
- I introduced small group discussions in my psychology classes, which typically have between 250 to 350 students. To prepare for these discussions, I ask students to individually annotate a case study before the class session, ensuring everyone has a role in the assignment. During the group meetings, they collaborate to address the provided prompts. Prior to commencing these discussions, all participants draft a collective course agreement, confirming their commitment to adhering to group rules. Additionally, there’s a mechanism in place for anonymously reporting any instances of a group member failing to contribute. This semester, a Ph.D. student is researching the outcomes of implementing small group discussions within a large lecture course for her doctoral thesis.

Laurent - Math
- Retrieval practice activity at the beginning of each lecture. The activity was typically a small exercise requiring students to retrieve and use material from previous lectures. Students work on the exercise on their own for about 5 minutes. Then, open discussion with the class to debrief and solve the exercise. I explicitly explained the strategy to students, the reason for implementing it and its goals. Ahead of each exam, I also discussed effective learning strategies for students to use as they study (retrieval practice and self-testing are more effective than rereading or highlighting lecture notes). I provided materials for students to use so that they can implement these strategies at home in addition to the work done in class.

Anna - Chemistry
- Incorporating practice exam questions related to the lab experiments into lectures would provide opportunities for students to enhance their scientific communication abilities. As they work through these sample questions based on the labs, students can develop the vocabulary, style, and approach needed to successfully answer open-response items on exams. This practice will also reinforce students’ comprehension of the core objectives and targets of each lab experiment.
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Facts:
Diversity, Equity, Accessibility & Inclusion*

- Poor preparation that requires remedial education, usually in **Math** or English.
- The Hechinger Report has found that at least half a million students a year are placed into remedial courses and many of them give up in frustration, according to the advocacy organization Complete College America.

*CollegeBoard AP Precalculus Symposium, Nov 2022

https://hechingerreport.org/more-high-school-grads-than-ever-are-going-to-college-but-1-in-5-will-drop/

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The Very Wide Racial Gap in College Graduation Rates

Six Year Graduation Rates (2015-2021)

- White: 68%
- Hispanic/Latino: 59.10%
- Black: 45.70%


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Key Takeaways:
Please retrieve your key takeaways

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2
3
Key Takeaways

• We hope our work will serve as a driving force to promote interdisciplinary discourse and increased awareness in an area that needs multifaceted approaches to a core issue of our time, namely the ongoing STEM recruitment and retention challenges, as it relates to student success and faculty collaborations.
Acknowledgements

• The faculty collaboration was organized as a Semester Support Group and funded through Rutgers’ Teaching Excellence Network (NSF EHR/DUE IUSE #2013315, PI: Mary Emenike, Co-PIs: Chaz Ruggieri, Phil Brown, Stacey Blackwell, Corey Ptak).

• Spring 2023 RR2PG Semester Support Group Participants:
  • Laurent Vera, Lyra Stein, Anna Kornienko.
Thank You

Dr. Sheila Tabanli
Assistant Teaching Professor
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